

Claims:

1. A process for producing carbon black comprising: introducing a fluid stream to sheath a process stream after introduction of a feedstock into the process stream.
- 5 2. The process of claim 1 wherein the fluid stream is introduced in an axial direction.
3. The process of claim 2 wherein the fluid stream is introduced with swirls.
4. The process of claim 3 wherein the fluid stream comprises a gaseous stream
- 10 including at least one of the following components: an oxidant, nitrogen, hydrogen, a hydrocarbonaceous material or mixtures thereof.
5. The process of claim 4 wherein the fluid stream comprises tail gas.
- 15 6. A process for producing carbon blacks comprising:
 generating a stream of combustion gases in a first stage of a reactor having a velocity sufficient to flow through subsequent stages of the reactor and a temperature sufficient to pyrolyze a carbon black yielding feedstock;
 injecting a carbon black yielding feedstock into the combustion gas in a second stage
20 of the reactor to produce an effluent composed of carbon black and combustion gases;
 introducing a fluid stream in a direction axial to the flow of the effluent after the injection of carbon black yielding feedstock, the resulting sheathed effluent passing through at least a portion of a third stage of the reactor; and
 cooling, separating, and recovering the carbon black product.
- 25 7. The process of claim 6 wherein the fluid stream is introduced so as to sheath the effluent stream entering the third stage of the reactor.
8. The process of claim 7 wherein the fluid stream is introduced with swirls.

9. The process of claim 7 wherein the fluid stream comprises a gaseous stream including at least one of the following components: an oxidant, nitrogen, hydrogen, a hydrocarbonaceous material or mixtures thereof.

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10. The process of claim 9 wherein the fluid stream comprises tail gas.

11. A modular apparatus for producing carbon black comprising:
a combustion zone having an upstream and a downstream end and at least one port to
allow the introduction of a fuel and an oxidant;
a zone of converging diameter having an upstream and a downstream end and
converging from the upstream end towards the downstream end, the upstream end being
connected to the downstream end of the combustion zone;
a transition zone having an upstream and a downstream end, the upstream end being
connected to the downstream end of the zone of converging diameter, the transition including
at least one port to allow the introduction of a feedstock;
an apparatus for introducing a fluid stream into the reactor in a direction axial to the
flow of a process stream in the reactor, the apparatus having an upstream and a downstream
end, the upstream end being connected to the downstream end of the transition zone;
a reaction zone having an upstream and a downstream end, the upstream end being
connected to the downstream end of the transition zone or zones;
a quench zone having an upstream and a downstream end, the upstream end being
connected to the downstream end of the reaction zone, the quench zone including at least one
port to allow the introduction of a quenching fluid; and
apparatus for separating and collecting carbon black connected to the downstream end
of the quench zone or zones.

12. The modular apparatus for producing carbon black of claim 11 wherein the
apparatus for introducing a fluid stream into the reactor in an axial direction comprises a

hollow vessel; at least one inlet for introducing a fluid stream into the interior of the vessel and an outlet to allow the fluid stream to exit from the vessel.

13. The apparatus of claim 12 wherein the outlet comprises an annulus.

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14. The apparatus of claim 12 wherein the inlet of the hollow vessel is disposed radially to the outlet to produce an outlet fluid stream without significant swirls.

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